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2009

Impact of deer and invasive plants on native habitats-a demonstration area


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2. b). Final Report: Project Number 06222

Impact of deer and invasive plants on native habitats-a demonstration area
Wild Resources Program; Pennsylvania Department of Conservation and Natural Resources

Project Scientist's: Gerard Hertel and Greg Turner, Department of Biology; West Chester University of Pennsylvania, West Chester, PA 19383 (610-436-2722; ghertel@wcupa.edu)

Project Summary: (How the proposed project will benefit species, habitats and/or other conservation goals):

The stated purpose of the Robert B. Gordon Natural Area for Environmental Studies (GNA) (www.gordonarea.org) is for education, research and protection of biodiversity. The public education role can be better filled by using this area to explain to interested publics, politicians and the media the impact that deer and invasive plants are having on ecosystems and ecosystem services that are provided at little or no cost to the public. The outcome will be that more focused efforts are directed toward these problems in Chester County. The undeveloped protected lands will be managed in a way to assure good land health. In jeopardy on the GNA are the 506 plant species, 52 birds (three area sensitive-wood thrush, oven bird, scarlet tanager) and 11 reptiles and amphibians (one in decline-four toed salamander) and 14 Orders and 55 species of stream-based macro-invertebrates that call this area home. Bryophytes and wood decay fungi are being cataloged in 2008/9. Without any management, it is projected that 75 years from now (once all the large native trees are gone) the area will be made up of maybe 20 plant species. Fifteen to 17 will be non-native plants!

Project Location: Describe project site and county, including ownership and management responsibility:

The GNA is located on the Campus of West Chester University of Pennsylvania in Chester Co. (see Google Earth 39 degrees 56 minutes 09.33 seconds N and 75 degrees 35 minutes 82 seconds W) The property is owned by the Pennsylvania Department of General Services. The Natural Area was dedicated in 1973 by the University.

Problem Statement: What conservation need does the project address? Cite relevant management plans that may apply.

Since 1973, when the area was officially dedicated, white-tailed deer, invasive plants and trail bikers have impacted the GNA. Over the past 10 years much has been written and many meetings have discussed the impacts of deer and invasive plants in Chester Co. Very little has come of these efforts and damage continues to accumulate. We live in a time when things must be seen in order to be believed and that is why a demonstration area is needed. Initially people could see just how removal of non-native invasive plants changed an area. In a few years people will be able to see the difference between the treated and untreated plots. An example of this is when we excluded deer (2005) from a small area in the flood plain and removed Japanese stilt grass. The following year we saw a thick healthy stand of jewelweed. In an area outside the fence there was no

jewelweed even in areas where stilt grass was removed. Two years later jewelweed was not so common but horsetail was very common. Two areas in the big woods section of the GNA were also fenced and non-natives removed in 2004. Most of the natives were larger than outside of the fences because no browsing had taken place.

Project Objectives: (List up to 5):

Establish a demonstration area where interested publics and students can visualize and get a better understanding of the impacts of deer and invasive plants on native plant communities-**completed**

Five people trained to train others in Chester County (**not done; much more time than originally planned was used to establish the study area**)

Train and utilize volunteers from local watershed associations, NGO's, environmental conservation teachers etc to remove invasive plants and collect data (**not done**)

Provide brochures to support the findings from the demonstration (**Dr Turner will produce brochure over the winter break 2008/9**)

Secure funding from local government entities for long term maintenance of the demonstration area (**new grant from USDA Forest Service was awarded December 2008**)

Project Deliverables (List up to 5):

Demonstration areas selected, exclosure corners established, plots established & treatments assigned & applied –January to June 2007-**completed**

Stipends announced (February) and winners selected-by May 2007 (**not completed**)

People trained, invasives removed/treated and data collection completed-June to August 2007 (used WCU students)-(**not done**)

Brochures and publicity prepared-September to November 2007 (**will be completed January 2009 by Dr Turner**)

Approach Townships (West Goshen, Westtown, East Bradford) where the GNA occurs in support of long term maintenance-July 2007. Will do the same for the Cooperative Extension Service; Chester Co Conservation District; Bureau of Forestry; USDA Forest Service. –(**USDA Forest Service will fund in January 2009**)

First tours-July 2008-(**delayed until July 2009**)

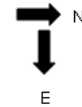
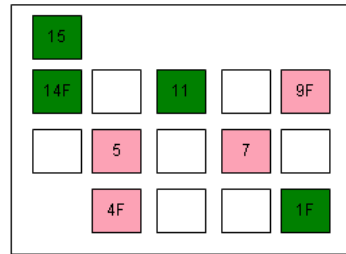
Final Report-August 2008-(**delayed until January 2009**)

Methodology summary:

0.05 acre plots (50 x 50ft) were located in the spring of 2007 in each of the flowing areas: big woods, flood plain and old field locations-see Figures 1 & 3. Eight plots in each area were selected for this demonstration based on the initial vegetation surveys. Four of the plots in each area were fenced (2 with no manipulation of vegetation; 2 with invasives removed). Four plots in each area were not fenced (2 with no manipulation of vegetation; 2 with invasives removed). All trees (> 5in DBH), saplings (<5in >1in DBH); seedlings (< 1in DBH > 1ft tall) were measured in each 24ft r circular plot (0.042 acre) in the 50 ft sq; Figure 2) of the 24 plots. Ground/canopy coverage was

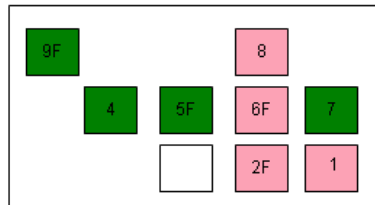
determined by layers (0-2ft; 2-6ft; 6-16ft and >16ft) for all species with >one percent cover. Baseline species richness and diversity will be determined as will change over time (each year beginning in 2009). Vegetation measures were made on all plots, treatments assigned, and invasives removed by hand from 4 plots at each location and then fences were constructed. Three 1m sq plots were established 8ft from plot center at 180, 300 and 60 degrees (Fig 2). All plant species were identified. A 15 minute walk in the rest of the 24ft r plots identified other plant species present

Big Woods #1



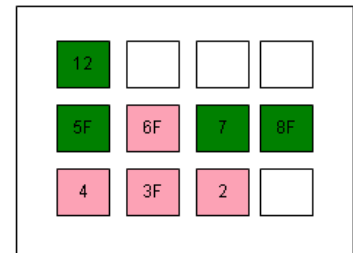
invasives removed
(1F, 11, 14F, 15)
invasives left
"F" next to number-fence
Clear-plots not being used

Flood plain



invasives removed (4, 5F, 7, 9F)
invasives left
"F" next to number-fence
Clear-plots not being used

Old farm



invasives removed (5F, 7, 8F, 12)
invasives left
"F" next to number-fence
Clear-plots not being used

Figure 1. Subplot layout & assigned treatment in three study area in the Gordon Natural Area at West Chester University of PA, Chester Co

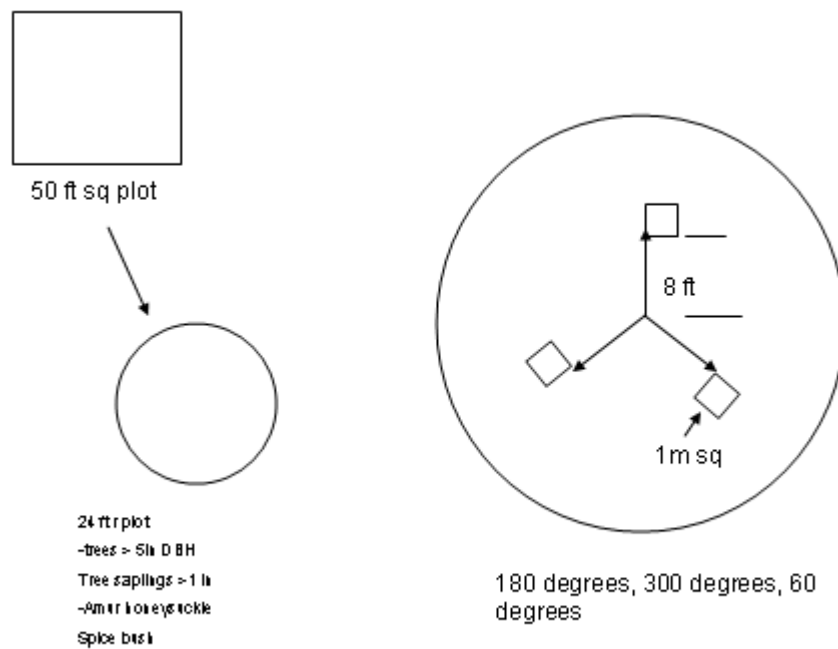


Figure 2. Subplots: 50 ft square area to encompass a 24 ft in diameter circular plot and layout of 3 1msq micro plots

Other Activities:

1. An Eagle Scout project was implemented in conjunction with this project. An Eagle Scout candidate constructed and installed benches and put trail markers in place for those visiting the Big Woods plots.
2. A tree seedling survey was conducted in September 2008 by a biology undergraduate student in conjunction with Dr Turner
3. A USDA Forest Service grant will allow us to maintain area in 2009
4. A graduate student will use the baseline data to develop a manuscript during the spring semester-2009
5. Excell data base available on request

Data

Tables 1-3. Each area (big woods, flood plain, old farm field) had 8 50ft sq plots (24ft r circular plot in each); 4 plots were fenced (2 plots had non-native plants removed) and 4 plots were not (2 plots had non-native plants removed)

- a. % plant cover
- b. Numbers of seedlings removed
- c. Numbers of large woody plants

Notes:

Big Woods

Amur honeysuckle (cover & numbers) and garlic mustard (cover) most common
On average there were 21 plant species (16-28)
On average 35% of plant species are non-natives (23-50%)
Amur honeysuckle seedlings dominate

Flood Plain

Stilt grass and barberry dominate the sites
On average there were 19 plant species (10-31)
On average 44% of plant species non-natives (36-53%)
Multiflora rose and privet seedlings dominate

Old Farm Field

Multiflora rose, tree of heaven and oriental bittersweet most common
On average there were 28 species (24-31)
On average 43% plant species non-natives (32-50%)
Barberry seedlings dominate

Figure 3. Wild Resources Program supported sites at West Chester University's Gordon Natural Area, November 2008

Big Woods (dominated by tulip poplar; note green leaves on Amur honeysuckle)



Flood Plain (dominated by red maple)



Old farm Field (1968) (dominated by white ash)

